

## REPORT DOCUMENTATION PAGE

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FORM 100-100

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6. AUTHOR(S) Multiple					
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) National Research Council Associateship Programs Office 500 Fifth Street, NW Washington, DC 20001				8. PERFORMING ORGANIZATION REPORT NUMBER AIRF 8016 Final	
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6/19/03

The National Research Council (NRC) administers competitive Postdoctoral and Senior Research Awards on behalf of the Air Force Office of Scientific Research. These awards are tenable at the Air Force Research Laboratory's nine technical Directorates, the United States Air Force Academy, and the Air Force Institute of Technology. Awards are for 1-3 years and are available to Ph.D. holding scientists and engineers at all stages of their careers. The awardees have the opportunity to conduct independent research in areas of science and engineering that add to the knowledge base, are compatible with the research needs, and further the interests of the Air Force.

A small sample of ongoing research efforts being conducted includes: Computational Fluid Dynamics Analysis and Code Development Applied to Unsteady Aerodynamics; Quantum Interference and Carrier Scattering in Quantum Wells; Investigation of Transonic Limit-Cycle Oscillation of a Wing with External Stores; and Investigation of the State-to-State Rotational Relaxation Rate Constants for Carbon Monoxide Following Collisions with Inert Gas Atoms Using Infrared Double Resonance.

Associates on tenure were citizens or Permanent Residents of 11 countries. While on tenure, the average Associate published one journal article and made four domestic presentations. Post-tenure plans included college or university professorships, US or foreign laboratory researchers, and post-doctoral appointments.

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# THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

Policy and Global Affairs  
Associateship Programs

01-15-03P03:07 RCVD

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January 9, 2003

Dr. Julie J. Moses  
Program Manager  
Academic and International Affairs  
Air Force Office of Scientific Research  
4015 Wilson Blvd., Rm. 861  
Arlington, VA 22203-1954

## **Re: Contract No. F49620-96-C-001 Final Status Technical Report**

Dear Dr. Moses:

The enclosed technical report is to fulfill our contractual obligations for:

Contract	<b>F49620-96-C-001</b>
Cost Center	<b>8016</b>
Title	<b>Air Force Research Laboratory Resident Research Associateship Program</b>
Contract Period	<b>October 15, 1995 – October 14, 2002</b>

The report covers the period August 15, 2001 through October 14, 2002. This report fulfills contractual requirements for technical reports. The original report and three copies are enclosed for your use.

Sincerely yours,



Robert H. Manka  
Associate Director and  
Program Administrator

Enclosures

cc: Karen Buck, AFOSR Contract Officer  
Rebecca LaPlante, Contract Administrator, NRC OCG (letter)  
Laboratory Contract File (letter)  
Laboratory Contract Report File

## **THE NATIONAL ACADEMIES**

*Advisers to the Nation on Science, Engineering, and Medicine*

### **National Research Council**

#### **RESEARCH ASSOCIATESHIP PROGRAM**

with the

Air Force Research Laboratory

Final Annual Contract Technical Report

Report Period: August 15, 2001 – October 14, 2002

Contract Number: F49620-96-C-001

#### **Publicity**

The National Academies Research Associateship Programs for the contract period were announced to the scientific community in the fall of the preceding year, 2000. Publicity materials describing the NRC-AFRL Program were distributed in November to presidents, graduate deans, and heads of appropriate science and engineering departments and minority-affairs offices of all academic degree-granting institutions in the United States. An e-mail announcement of the Programs was sent to these same contact points prior to each review deadline. Promotional materials were sent to Laboratory Program Representatives, Associateship Advisers, and other interested persons. General advertisements of Programs were placed in leading scientific and engineering publications. Publicity materials and other related information were made available on the internet. Research Associateship Programs staff attended numerous society meetings and minority recruitments to promote the various Programs and meet with prospective applicants throughout the year.

#### **Requests**

Application materials were distributed in response to specific requests for information about the NRC-AFRL Research Associateship Program or as a result of general requests by persons whose fields of specialization appeared to be appropriate for the research opportunities available in the AFRL laboratories.

**Competition**

Panel reviews of applicants for the Research Associateship Programs, including those with the Air Force Research Laboratory, are conducted in February, June, and October of each year. The following is a breakdown of the action taken with the applications during the report period.

	<b><u>Oct. 01</u></b>	<b><u>Feb. 02</u></b>	<b><u>June 02</u></b>	<b><u>TOTAL</u></b>
<b>TOTAL APPLICATIONS</b>	<b>15</b>	<b>12</b>	<b>8</b>	<b>35</b>
<b>Number of Applications Reviewed</b>	<b>11</b>	<b>10</b>	<b>6</b>	<b>27</b>
Applications Not Recommended (did not pass Review)	0	0	0	0
<b>Applications Recommended (passed Review)</b>	<b>11</b>	<b>10</b>	<b>6</b>	<b>27</b>
Awards Offered	9	9	4	22
Awards Accepted	7	8	4	19
Awards Declined	1	1	0	2
Awards Withdrawn by NRC (NRC officially withdrew award <i>after</i> it had been accepted.)	1	0	0	1

**Associates' Citizenship**

Associates on tenure as of August 15, 2001, were citizens or Permanent Residents of the following countries:

Belarus	1	Japan	1
Bulgaria	1	Republic of Korea	3
England	1	Russia	1
Germany	1	Turkey	1
Greece	1	United States	30
India	3		

### Associates' Activities

Associates who ended tenure during the report period were on tenure for an average of 17 months, ranging from 4 months to 36 months.

Of the 14 Associates who ended tenure during the report period, 7 (50%) submitted reports. In the termination reports, Associates indicated the following scholarly activity while on tenure.

7	Articles Published in Refereed Journals	30	Domestic Presentations
0	Patent Applications	0	Award
2	International Presentations		

After ending their tenure, Associates indicated their future plans as follows:

2	College or University Professor	2	Research Position at Foreign Gov't. Laboratory
1	PostDoc		
1	Unemployed		
1	Research – National Government (US or Foreign)		

In their final reports, Associates were asked to evaluate certain aspects of their experiences on a scale of 1 (low) to 10 (high). The average rating for each item follows:

----	<i>Short-Term Value:</i>	Development of knowledge, skills, and research productivity
----	<i>Long-Term Value:</i>	How your NRC Research Associateship affected your <i>career</i> to date
8.0	<i>Laboratory:</i>	Quality of the support you received from the federal <i>Laboratory</i>
8.1	<i>NRC:</i>	Quality of the support you received from the <i>NRC</i>

Advisers also were asked to complete an evaluation of the Associate. The following summarizes the Adviser evaluations for Associates ending tenure during the contract period. Of the 14 Associates who ended tenure, 2 (48%) Adviser evaluations were completed. Assessments were made on four criteria using the following rating scale: 1-below average, 2-average, 3-above average, 4-good, and 5-outstanding/exceptional. The average rating for each item follows:

3.0	Knowledge of Field	3.5	Independence
4.0	Innovative Thinking	5.0	Motivation
4.5	Research Techniques	4.0	Overall Scientific Ability

The Adviser was asked, "Would you like this Associate as a Professional Colleague?" The Advisers responded in the following manner:

2	100%	Yes	0	0%	No Comment
0	0%	No	0	0%	No Answer

Additional information about the Associates' activities can be found in the attachments described below and the Appendix.

**Attachment 1:** Associates who ended their tenure between August 15, 2001, and October 14, 2002. It includes the Associate's Laboratory location, the starting and termination dates, and the names of their Advisers. Associates are required to submit reports upon termination, and Advisers are asked to submit a final evaluation of each Associate. Associates who have not submitted a termination report have received follow-up correspondence.

**Attachment 2:** Associates on tenure as of October 15, 2002. This list includes the Associate's Adviser, Laboratory location, start and expected termination dates, and country of citizenship.

**Attachment 3:** Applicants who received and accepted awards between August 15, 2001, and October 14, 2002. It includes the title of the research proposals.

**Attachment 4:** All recommended candidates by category (e.g., Accepted, No Funding, Declined, etc.). This report includes information about the Ph.D. institution, title of proposed research, starting date, and Adviser.

**Attachment 5:** Cross tabulation of the number of Associates on tenure at each Center by quarter for the year within the report period and for the years preceding and following the report period.

**Attachment 6:** Patent applications, if applicable, and Summaries of Research from the Associates' Final Reports. This list includes the patent application titles, inventor(s) and date of application.

**Appendix:** Final Reports received from the Associates who ended tenure during the report period.

# Associates Who Ended Tenure 8/15/2001 - 10/14/2002

## Attachment 1

### Air Force Research Laboratory

1/10/2003 Page 1 of 1

Associate Name+ Adviser	Center	Tenure Dates		Termination Report	Adviser Report
		Start	End		
Castle, Karen Janene Dr. James A. Dodd	Space Vehicles Directorate	7/17/00	5/31/02	Received	Not Recd
Hinsz, Verlin Blaine(S) Dr. Barry P. Goettl	Human Effectiveness Directorate	8/01/01	7/31/02	Received	Not Recd
Kobryanskii, Valerii Mikhailovic(S) Dr. Douglas S. Dudis	Materials & Manufacturing Directorate	9/04/01	9/03/02	Not Recd	Not Recd
Miller, J. Scott Dr. Rainer A. Dressler	Space Vehicles Directorate	7/17/00	3/04/02	Received	Not Recd
Oka, Soichi Dr. Steven R. LeClair	Materials & Manufacturing Directorate	6/28/01	6/27/02	Received	Received
Osswald, Gary Allen(S) Dr. Philip S. Beran	Air Vehicles Directorate	6/01/01	9/30/01	Not Recd	Not Recd
Park, Soo-Young Dr. Douglas S. Dudis	Materials & Manufacturing Directorate	3/01/00	2/20/02	Received	Not Recd
Perel, Victor Yuryevich Dr. Robert L. Crane	Materials & Manufacturing Directorate	7/17/00	7/16/02	Not Recd	Not Recd
Rotman, Stanley Richard(S) Dr. Jerry Silverman	Sensors Directorate	10/01/01	9/30/02	Received	Not Recd
Siegel, Stefan Guenther Dr. Julie A. Morrow	US Air Force Academy	6/01/01	5/31/02	Not Recd	Not Recd
Skormin, Victor Arcady(S) Dr. Donald J. Nicholson	Information Directorate	10/26/99	8/31/01	Not Recd	Not Recd
Tassev, Vladimir Lubomirov Dr. David F. Bliss	Sensors Directorate	9/01/00	8/31/02	Not Recd	Not Recd
Wilson, John Patrick Dr. Bruce Suter	Information Directorate	8/20/01	8/19/02	Received	Not Recd

13 Associates Listed

+ (S) indicates the associate was a Senior.

Highlighted entries indicate no entry on the Award Init Screen but data on the Post Tenure Screen.



# Associates On Tenure

October 15, 2002

## Attachment 2

### Air Force Research Laboratory

1/10/2003 Page 1 of 2

Associate Name+ Adviser	Center Citizenship	Starting Date	Ending Date
* Anderson, Kelly Loren Dr. Barry L. Farmer	Materials & Manufacturing Directorate United States	9/10/02	9/09/03
* Anthony, Richard James Dr. Richard B. Rivir	Propulsion Directorate United States	9/30/02	9/29/03
Apostolova, Tzvetia Tihomirova Dr. David A. Cardimona	Space Vehicles Directorate United States	5/14/01	5/13/03
* Ashokkumar, C.R. (S) Dr. James R. Cloutier	Munitions Directorate India	7/08/02	7/07/03
* Bolender, Michael A. Dr. Andrew Sparks	Air Vehicles Directorate United States	4/29/02	4/28/03
* Bolonkin, Alexander Alexandrovich (S) Dr. James R. Cloutier	Munitions Directorate United States	1/14/02	1/13/04
* Chambreau, Steven Dennis Dr. James A. Dodd	Space Vehicles Directorate United States	5/01/02	4/30/03
* Craig, A. Morrie (S) Dr. Jim Spain	Materials & Manufacturing Directorate United States	1/07/02	1/06/03
* Del Sesto, Rico Emilio Dr. John S. Wilkes	US Air Force Academy United States	4/22/02	4/21/03
Eastep, Franklin Eugene (S) Dr. Narendra S. Khot	Air Vehicles Directorate United States	2/15/01	2/14/03
* Fernandez, Abel Dr. Albert A. Viggiano	Space Vehicles Directorate United States	10/07/02	10/06/03
* Han, Keesook Julia Dr. Bruce Suter	Information Directorate United States	5/30/02	5/29/03
* Hostutler, David Anthony Dr. Gordon D. Hager	Directed Energy Directorate United States	6/03/02	6/02/03
* Huh, Wansoo (S) Dr. Barry L. Farmer	Materials & Manufacturing Directorate Republic Of Korea	3/04/02	3/03/03
* Iroh, Jude Onwuegbu (S) Dr. Michael S. Donley	Materials & Manufacturing Directorate United States	3/22/02	3/21/03
* Jacobsen, Lance Steven Dr. Thomas A. Jackson	Propulsion Directorate United States	12/20/01	12/19/03
* Jakubiak, Rachel Dr. Richard A. Vaia	Materials & Manufacturing Directorate United States	1/11/02	1/10/04
* Jefferson, George Joseph Dr. Ronald J. Kerans	Materials & Manufacturing Directorate United States	10/01/02	9/30/03
Kadiyala, Venkateswarlu (S) Dr. Jim Spain	Materials & Manufacturing Directorate India	5/17/01	5/16/03
* Khalatov, Artem Artemovich (S) Dr. Aaron R. Byerley	US Air Force Academy Ukraine	10/01/02	9/30/03
Kim, Ben Woong-Nyon Dr. Arnold H. Mayer	Air Vehicles Directorate United States	3/01/01	2/28/03
Kraemer, Kathleen Elizabeth Dr. Stephan D. Price	Space Vehicles Directorate United States	1/03/00	11/01/02

\*Indicates that the associate started tenure between 10/15/2001 and 10/14/2002.

(S) Associate is a Senior.

**Associates On Tenure**

October 15, 2002

**Attachment 2****Air Force Research Laboratory**

1/10/2003 Page 2 of 2

Associate Name+ Adviser	Center Citizenship	Starting Date	Ending Date
Mitchell, Jason William Dr. Andrew Sparks	Air Vehicles Directorate United States	9/05/00	9/04/03
* Nifiatis, Fotis Dr. Jeffrey W. Baur	Materials & Manufacturing Directorate US Permanent Resident	5/10/02	5/09/03
Parish, John Walter Dr. Biswa N. Ganguly	Propulsion Directorate United States	6/25/01	6/24/03
* Ryu, Mee-Yi Dr. Yung Kee Yeo	Air Force Inst of Technology Republic Of Korea	5/01/02	4/30/03
* Sathiraju, Srinivas (S) Dr. Paul N. Barnes	Propulsion Directorate India	10/01/02	9/30/03
Smith, Tony C. Dr. Gordon D. Hager	Directed Energy Directorate United States	6/04/01	6/03/03
* Tikhonov, Nikolay Ivanovich (S) Dr. Daniel W. Repperger	Human Effectiveness Directorate Russia	8/20/02	8/19/03
* Vasilyev, Vladimir Sergeevich (S) Dr. Alvin J. Drehman	Sensors Directorate US Permanent Resident	1/07/02	1/06/04
Vatansever, Fatma Dr. Richard A. Vaia	Materials & Manufacturing Directorate US Permanent Resident	5/07/01	5/06/03
* Weber, Erik Henry Dr. Wesley P. Hoffman	Propulsion Directorate United States	1/22/02	12/27/02
Woodcock, Leslie Victor (S) Dr. Donald L. Dorsey	Materials & Manufacturing Directorate England, U.K.	2/05/01	2/04/03

\*Indicates that the associate started tenure between 10/15/2001 and 10/14/2002.

(S) Associate is a Senior.

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**Name/  
Research Title**

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**October 2001 Awardees**

Awardees Listed 7

Anthony, Richard J

Thin Film Heat Flux Sensor Development for High Speed Flow Measurements

Del Sesto, Rico E

Nonlinear Optics and Nanoelectronics

Huh, Wansoo

Synthesis of Carbon Nanotubes with Controlled Nanostructures for Applications in Nano-devices

Iroh, Jude O

Functional Aerospace Corrosion Resistant Coatings

Jakubiak, Rachel

Core-Shell Electro-Optic Nanoparticles with Conjugated Organic Coronas: Tuning the Performance of Nanophotonic Building Blocks

Smith, Adam P

Development of High-Throughput Synthesis and Screening for Multi-Photon Organic-Inorganic Hybrids

Weber, Erik H

Development of Micro Metal Injection Molding for Nano-satellite Components

**February 2002 Awardees**

Awardees Listed 8

Ashokkumar, C.R.

Reconfigurable Architecture for Cooperative Control

Bolender, Michael A

Improvement of Control Allocation Algorithms as Applied to the Adaptive/Re-Configurable Control of Hypersonic Vehicles

Cacciani, Alessandro

Two-lines Doppler and Magnetic Imaging of the Sun Through the Magneto-Optical Filter

Chambreau, Steven D

Reaction Pathways in Hyperthermal O-Alkene Interactions

Han, Keesook J

Multirate and Wavelet Signal Processing

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Name/ Research Title
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Hostutler, David A  
Study of the Rotational Relaxation Rates of NO by Double Resonance and Zeeman Spectroscopy

Jefferson, George J  
Analytical and FEM Models for Integrated Design of Novel Hybrid Composite Materials/Components

Ryu, Mee-Yi  
Electrical and Optical Studies of As-Grown and Ion-Implanted Wide Bandgap Semiconductors

**June 2002 Awardees**

Awardees Listed 4

Anderson, Kelly L  
Modeling Structure Development in Polymer-Clay Nanocomposites

Fernandez, Abel  
Ion Kinetics for MGD Modeling of Plasma-Enhanced Combustion Systems

Sathiraju, Srinivas  
Studies on Process Conditions, Structure-Property Relationship of Second Generation Coated Conductors on Various Metal Substrates

Tikhonov, Nikolay I  
Intelligent Parametric Visual Thinking System (IPVTS) as Paradigm for Control Strategies in Robotics

**October 2002 Awardees**

Awardees Listed 2

Pender, Mark J  
Biologically Inspired Routes for the Synthesis and Construction of Ordered Arrays of Carbon Nanotubes

Pozhar, Liudmila A  
Theoretical and Computational Fundamentals of Virtual Fabrication of Nanoheterostructure Units with Designed Electronic Properties

Total Associates Listed for Lab 21

## October 2001

**Z- Recommended/No Funding** ( 3 Applicants listed)

BENOSMAN, MOUHACINE A		Ph.D. Date: 2002
Citizenship:	Algeria	University of Nantes/France
Adviser:	Dr. Alok Das	
Research Field:	Robotics	
Research Title:	Control of Spatial-3D Flexible Multi-Link Manipulators Without Residual Tip Oscillations	

FERNANDEZ, ABEL		Ph.D. Date: 2002
Citizenship:	United States	Rensselaer Polytechnic Inst/NY
Adviser:	Dr. Albert A. Viggiano	
Research Field:	Atmospheric Chemistry	
Research Title:	Ion Kinetics for MGD Modeling of Plasma-Enhanced Combustion Systems	

LESTARI, WAHYU  
 Citizenship: Indonesia  
 Adviser: Dr. Davy M. Belk  
 Research Field: Mechanical Science  
 Research Title: Simulation of Shear Band Formation in the Projectile Penetration Using Irreversible Thermodynamic Model

Ph.D. Date: 2001  
 Georgia Institute of Technology

**A- Accepted Award** ( 7 Applicants listed)

ANTHONY, RICHARD J		Ph.D. Date: 2001	
Citizenship:	United States	University of Oxford/England	
Adviser:	Dr. Richard B. Rivir	Actual Starting Date:	9/30/02
Research Field:	Mechanical Engineering	Termination Date:	9/29/03
Research Title:	Thin Film Heat Flux Sensor Development for High Speed Flow Measurements		

DEL SESTO, RICO E	Ph.D. Date: 2002
Citizenship: United States	University of Utah
Adviser: Dr. John S. Wilkes	Actual Starting Date: 4/22/02
Research Field: Chemistry	Termination Date: 4/21/03
Research Title: Nonlinear Optics and Nanoelectronics	

HUH, WANSOO		Ph.D. Date: 1986	
Citizenship:	Republic of Korea	University of Connecticut	
Adviser:	Dr. Barry L. Farmer	Actual Starting Date:	3/04/02
Research Field:	Material Science	Termination Date:	3/03/03
Research Title:	Synthesis of Carbon Nanotubes with Controlled Nanostructures for Applications in Nano-devices		

**Recommended Candidates    8/15/2001 - 10/14/2002**  
**Air Force Research Laboratory**

**Attachment 4**

1/10/2003 Page 2 of 7

**IROH, JUDE O**

Citizenship: United States

Adviser: Dr. Michael S. Donley

Research Field: Coatings Technology

Research Title: Functional Aerospace Corrosion Resistant Coatings

Ph.D. Date: 1990

University of Connecticut

Actual Starting Date: 3/22/02

Termination Date: 3/21/03

**JAKUBIAK, RACHEL**

Citizenship: United States

Adviser: Dr. Richard A. Vaia

Research Field: Physical Chemistry

Research Title: Core-Shell Electro-Optic Nanoparticles with Conjugated Organic Coronas: Tuning the Performance of Nanophotonic Building Blocks

Ph.D. Date: 2000

University of Rochester/NY

Actual Starting Date: 1/11/02

Termination Date: 1/10/04

**SMITH, ADAM P**

Citizenship: United States

Adviser: Dr. Richard A. Vaia

Research Field: Polymer Chemistry

Research Title: Development of High-Throughput Synthesis and Screening for Multi-Photon Organic-Inorganic Hybrids

Ph.D. Date: 2002

University of Virginia

Actual Starting Date: 11/04/02

Termination Date: 11/03/03

**WEBER, ERIK H**

Citizenship: United States

Adviser: Dr. Wesley P. Hoffman

Research Field: Material Science

Research Title: Development of Micro Metal Injection Molding for Nano-satellite Components

Ph.D. Date: 2001

Michigan Technological University

Actual Starting Date: 1/22/02

Termination Date: 12/27/02

**8- Declined**

**KALLMAN, ROBERT R**

Citizenship: United States

Adviser: Dr. Dennis H. Goldstein

Research Field: Optical Signal Processing

Research Title: The Mathematics of Mueller Matrices and Polarimetric Imagery

Ph.D. Date: 1968

Massachusetts Inst of Technology

**February 2002**

**1- Recommended**

**BROOKE, GEORGE M**

Citizenship: United States

Adviser: Dr. Randall J. Knize

Research Field: Atomic Physics

Research Title: Bose-Einstein Condeensation of Cesium Atoms and Molecules

Ph.D. Date: 2002

Old Dominion University/VA

**Recommended Candidates    8/15/2001 - 10/14/2002**  
**Air Force Research Laboratory**

**Attachment 4**

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**A- Accepted Award** ( 8 Applicants listed)

ASHOKKUMAR, C.R.	Ph.D. Date: 1994
Citizenship: India	Ohio State University
Adviser: Dr. James R. Cloutier	Actual Starting Date: 7/08/02
Research Field: Aero/Astro Engineering	Termination Date: 7/07/03
Research Title: Reconfigurable Architecture for Cooperative Control	
BOLENDER, MICHAEL A	Ph.D. Date: 2000
Citizenship: United States	University of Cincinnati/OH
Adviser: Dr. Andrew Sparks	Actual Starting Date: 4/29/02
Research Field: Aerospace Engineering	Termination Date: 4/28/03
Research Title: Improvement of Control Allocation Algorithms as Applied to the Adaptive/Re-Configurable Control of Hypersonic Vehicles	
CACCIANI, ALESSANDRO	Ph.D. Date: 1961
Citizenship: Italy	U Roma La Sapienza-Citta U/Italy
Adviser: Dr. Richard C. Altrock	Expected Starting Date: 1/15/03
Research Field: Astrophysics	Termination Date: 1/14/04
Research Title: Two-lines Doppler and Magnetic Imaging of the Sun Through the Magneto-Optical Filter	
CHAMBREAU, STEVEN D	Ph.D. Date: 2002
Citizenship: United States	Univ of California-Riverside
Adviser: Dr. James A. Dodd	Actual Starting Date: 5/01/02
Research Field: Chemistry	Termination Date: 4/30/03
Research Title: Reaction Pathways in Hyperthermal O-Alkene Interactions	
HAN, KEESOOK J	Ph.D. Date: 2001
Citizenship: United States	University of Minnesota-Twin Cit
Adviser: Dr. Bruce Suter	Actual Starting Date: 5/30/02
Research Field: Electrical Engineering	Termination Date: 5/29/03
Research Title: Multirate and Wavelet Signal Processing	
HOSTUTLER, DAVID A	Ph.D. Date: 2002
Citizenship: United States	University of Kentucky
Adviser: Dr. Gordon D. Hager	Actual Starting Date: 6/03/02
Research Field: Spectroscopy	Termination Date: 6/02/03
Research Title: Study of the Rotational Relaxation Rates of NO by Double Resonance and Zeeman Spectroscopy	
JEFFERSON, GEORGE J	Ph.D. Date: 1999
Citizenship: United States	University of Pennsylvania
Adviser: Dr. Ronald J. Kerans	Actual Starting Date: 10/01/02
Research Field: Materials Engineering	Termination Date: 9/30/03
Research Title: Analytical and FEM Models for Integrated Design of Novel Hybrid Composite Materials/Components	

RYU, MEE-YI		Ph.D. Date: 2001	
Citizenship:	Republic of Korea	Kwangwoon University/Korea	
Adviser:	Dr. Yung Kee Yeo	Actual Starting Date:	5/01/02
Research Field:	Engineering Physics	Termination Date:	4/30/03
Research Title:	Electrical and Optical Studies of As-Grown and Ion-Implanted Wide Bandgap Semiconductors		

**8- Declined**

UPATNIEKS, ANSIS  
 Citizenship: United States  
 Adviser: Dr. Thomas A. Jackson  
 Research Field: Fluid Dynamics  
 Research Title: Time-Resolved Imaging of Unsteady FLOW Phenomena in Scramjet Combustors

Ph.D. Date: 2002  
 University of Michigan-Ann Arbor

## June 2002

**1- Recommended** ( 2 Applicants listed)

BURRILL, ANDREW B		Ph.D. Date: 2002
Citizenship:	United States	State U of New York-Stony Brook
Adviser:	Dr. Steven M. Miller	
Research Field:	Chemical Physics	
Research Title:	Laser Induced Fluorescence Studies of the Products of the Reactions of Propene, Vinyl Radical and Allyl Radical with Hyperthermal Oxygen Atoms	

YANG, SANG H		Ph.D. Date: 1996
Citizenship:	United States	U of Illinois-Urbana-Champaign
Adviser:	Dr. Rajiv Berry	
Research Field:	Physics and Engr Physics	
Research Title:	Nanoparticle Simulations for Efficient (25-35%) Flexible, Thin-Film Photovoltaics	

**A- Accepted Award** ( 4 Applicants listed)

ANDERSON, KELLY L		Ph.D. Date: 2002	
Citizenship:	United States	University of Cambridge/England	
Adviser:	Dr. Barry L. Farmer	Actual Starting Date:	9/10/02
Research Field:	Molecular Physics	Termination Date:	9/09/03
Research Title:	Modeling Structure Development in Polymer-Clay Nanocomposites		

FERNANDEZ, ABEL		Ph.D. Date: 2002	
Citizenship:	United States	Rensselaer Polytechnic Inst/NY	
Adviser:	Dr. Albert A. Viggiano	Actual Starting Date:	10/07/02
Research Field:	Atmospheric Chemistry	Termination Date:	10/06/03
Research Title:	Ion Kinetics for MGD Modeling of Plasma-Enhanced Combustion Systems		



**Recommended Candidates    8/15/2001 - 10/14/2002**  
**Air Force Research Laboratory**

**Attachment 4**

1/10/2003 Page 5 of 7

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SATHIRAJU, SRINIVAS  
Citizenship: India  
Adviser: Dr. Paul N. Barnes  
Research Field: Engineering Phys and Mat Sci  
Research Title: Studies on Process Conditions, Structure-Property Relationship of Second Generation Coated Conductors on Various Metal Substrates

Ph.D. Date: 1997  
University of Hyderabad/India  
Actual Starting Date: 10/01/02  
Termination Date: 9/30/03

TIKHONOV, NIKOLAY I  
Citizenship: Russia  
Adviser: Dr. Daniel W. Repperger  
Research Field: Computer Science  
Research Title: Intelligent Parametric Visual Thinking System (IPVTS) as Paradigm for Control Strategies in Robotics

Ph.D. Date: 1976  
Moscow Automech Inst/Russia  
Actual Starting Date: 8/20/02  
Termination Date: 8/19/03

**October 2002**

**1- Recommended ( 12 Applicants listed)**

ALTSHULLER, DMITRY A  
Citizenship: United States  
Adviser: Dr. Daniel W. Repperger  
Research Field: Cybernetics  
Research Title: Human System Power (Haptic) Management System Using Methods of Absolute Stability

Ph.D. Date: 2002  
St. Petersburg State Univ/Russia

ANDERSON, STANLEY E  
Citizenship: United States  
Adviser: Dr. Shawn H. Phillips  
Research Field: Polymer Science and Engr  
Research Title: Structural Studies of Polyhedral Oligomeric Silsesquioxane (POSS) Polymers and Precursors

Ph.D. Date: 1969  
U of Illinois-Urbana-Champaign

CAO, YONG-YAN  
Citizenship: People's Republic of China  
Adviser: Dr. Daniel W. Repperger  
Research Field: Control Systems  
Research Title: Analysis and Design of Force Reflecting Teleoperators with Large Time Delays

Ph.D. Date: 1996  
Zhejiang University/China P-Re

COOKE, NANCY J  
Citizenship: United States  
Adviser: Dr. Winston Bennett, Jr  
Research Field: Applied Psychology  
Research Title: Knowledge Assessment for Distributed Mission Training

Ph.D. Date: 1987  
New Mexico State University

**Recommended Candidates    8/15/2001 - 10/14/2002**  
**Air Force Research Laboratory**

**Attachment 4**

1/10/2003 Page 6 of 7

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JOHNSON, DAVID W  
Citizenship: United States  
Adviser: Dr. Nelson H. Forster  
Research Field: Chemistry  
Research Title: Interaction of Aryl-Phosphate Based Lubricant Additives with Modern Bearing Materials

Ph.D. Date: 1983  
Illinois Institute of Technology

KELLEY-LOUGHNANA, NANCY  
Citizenship: United States  
Adviser: Dr. John M. Frazier  
Research Field: Biomolecular Engineering  
Research Title: Designing Tools for Biomolecular Network Modeling

Ph.D. Date: 2000  
Boston University/MA

KHOLODAR, DENIS B  
Citizenship: Russia  
Adviser: Dr. Scott A. Morton  
Research Field: Aeronautical Engineering  
Research Title: Computational Aeroelasticity of Full Aircraft

Ph.D. Date: 2002  
Duke University/NC

LEVIN, GEORGE A  
Citizenship: United States  
Adviser: Dr. Paul N. Barnes  
Research Field: Physics  
Research Title: The Effects of Sheared Flow of Magnetic Vortices on Electrical Conduction in High-Tc Superconductors

Ph.D. Date: 1994  
Kent State University/OH

MCCLAIN, MARK D  
Citizenship: United States  
Adviser: Dr. Douglas S. Dudis  
Research Field: Polymer Chemistry  
Research Title: Electroactive Polymers of Thiazolo(5,4-d)thiazole for Electronic Applications

Ph.D. Date: 1994  
University of Michigan-Ann Arbor

MORENO, LUIS A  
Citizenship: United States  
Adviser: Dr. William B. Albery  
Research Field: Aviation Medicine  
Research Title: Evaluation of an Integrated Sensory Cueing System for Spatial Disorientation Countermeasures in the Maneuvering Acceleration Environment

Ph.D. Date: 1993  
Texas A&M Univ-Col of Medicine

PARIDA, BASANT K  
Citizenship: India  
Adviser: Dr. Shankar Mall  
Research Field: Fatigue  
Research Title: Some Studies on the Local Buckling Behavior of Thin Sheets with Rectangular Cut-Outs

Ph.D. Date: 1977  
Indian Inst of Tech, Kharagpur

**Recommended Candidates    8/15/2001 - 10/14/2002**  
**Air Force Research Laboratory**

**Attachment 4**

1/10/2003 Page 7 of 7

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PHILLIPS, DAVID M  
Citizenship: United States  
Adviser: Dr. Jeffrey S. Zabinski  
Research Field: Tribology  
Research Title: Ultra-Thin Liquid Films for MEMS Lubrication

Ph.D. Date: 2002  
Carnegie Mellon University/PA

**A- Accepted Award ( 2 Applicants listed)**

PENDER, MARK J  
Citizenship: United States  
Adviser: Dr. Morley O. Stone  
Research Field: Biotechnology  
Research Title: Biologically Inspired Routes for the Synthesis and Construction of Ordered Arrays of Carbon Nanotubes

Ph.D. Date: 2001  
University of Pennsylvania  
Actual Starting Date: 12/16/02  
Termination Date: 12/15/03

POZHAR, LIUDMILA A  
Citizenship: Ukraine  
Adviser: Dr. William C. Mitchel  
Research Field: Chemical Physics  
Research Title: Theoretical and Computational Fundamentals of Virtual Fabrication of Nanoheterostructure Units with Designed Electronic Properties

Ph.D. Date: 1994  
Ukraine Academy of Sciences  
Actual Starting Date: 1/06/03  
Termination Date: 1/05/04

**On Tenure Report  
by Quarter and Center**

For the year starting  
August 15, 2001

**Attachment 5**  
1/10/2003 Page 1 of 1

**Air Force Research Laboratory**

Center	Number of Associates on tenure as of					
	8/15/00	8/15/01	11/15/01	2/15/02	5/15/02	8/15/02
Air Force Inst of Technology	-	-	-	-	1	1
Air Vehicles Directorate	-	4	3	3	4	4
Directed Energy Directorate	1	1	1	1	1	2
Human Effectiveness Directorate	2	1	1	1	1	-
Information Directorate	1	1	1	1	1	2
Materials & Manufacturing Directorate	3	6	7	9	11	9
Munitions Directorate	-	-	-	1	1	2
Propulsion Directorate	-	1	1	3	3	3
Sensors Directorate	-	1	2	3	3	3
Space Vehicles Directorate	3	4	4	4	4	3
US Air Force Academy	1	1	1	1	2	1
	11	20	21	27	32	30

**Air Force Research Laboratory**

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**Castle, Karen Janene**

**7/17/2000 5/31/2002**

- 2 Characterized vibrational energy transfer efficiencies for the NO(v)-O systems for v=1 and 2 at room temperature and for v=1 between 295 and 850 K
- 3 Explored possible experimental approaches for measuring the CO<sub>2</sub> ( $\nu_2$ ) - O vibration relaxation: achieved stimulated Raman excitation of the CO<sub>2</sub> bending mode and monitored relaxation using transient diode laser absorption.
- 4 Acquired/learned to use a Brunker step-scan FTIR spectrometer for measuring time-resolved reaction product distributions; worked with Bruker technicians to improve OPUS software and develop experimental approach.
- 5 Acquired FTIR data following O\* + C<sub>2</sub>H<sub>4</sub> and O\* + C<sub>3</sub>H<sub>6</sub> reactions (products included vibrationally excited alkene, CO, HCO, and H<sub>2</sub>CO) and developed computer model for analyzing CO product distribution from multiple pathways.
- 6 Explored the effects of using different o-atom sources on O\* + C<sub>2</sub>H<sub>4</sub> reaction, and found that NO<sub>2</sub> and SO<sub>2</sub> sources yield very different CO product distributions.

**Hinsz, Verlin Blaine**

**8/01/2001 7/31/2002**

- 2 Modeling crew performance in dynamic task environments.
- 3 Representing performance of UAV ground station crews.
- 4 Benchmarks for AWACS weapons director crews.
- 5 Implications of a teams-as-information-processors perspective.
- 6 Implications of information processing biases in teams for information warfare.

**Miller, J. Scott**

**7/17/2000 3/04/2002**

- 2 Developed the capability to measure the collisional energy dependence of state-selected ion-molecule reaction dynamics at the LBNL Advanced Light Source.
- 3 Determined absolute Xenon charge exchange cross sections for direct use in electrostatic thruster models.

**Air Force Research Laboratory**

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- 4 Measured the influence of a charge transfer pathway on vibrational effects in ion-molecule reaction dynamics for use in vibrational scaling models.

**Oka, Soichi**

6/28/2001 6/27/2002

- 2 Image mining of evanescent microwave data for nondestructive material inspection.

- 3 Image mining using coupled unsupervised neural networks.

**Park, Soo-Young**

3/01/2000 2/20/2002

- 2 Studies on the structure and molecular modeling of poly(silylenemethylene)s

- 3 Studies on structures and molecular modeling of naphthalene-based rigid rod polymers.

- 4 Studies on the structures of sulfone-containing polymers.

- 5 Studies on the wholly-aromatic thermotropic polyesters.

- 6 Studies on the morphology of the PBO film for the fuel cell membrane.

**Rotman, Stanley Richard**

10/01/2001 9/30/2002

- 2 Demonstrated segmentations of hyperspectral imagery based on the most significant principal components of the hyperspectral data cube.

- 3 Two methods of detecting point targets in hyperspectral images were attempted. The first uses the principal component images, the second is based on a median-filtered full hyperspectral cube. Detection vs. false alarm comparisons are made.

- 4 Developed a course on the digital signal processing of hyperspectral imagery. I taught this course to interested AFRL personnel.

**Air Force Research Laboratory**

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**Wilson, John Patrick**

**8/20/2001 8/19/2002**

- 2 Found that it is not possible to construct a Uniform Reconstruction Quantizer that is a Successive Refinement Quantizer.
- 3 Approach to embedded context-based adaptive quantization along the lines of the non-embedded work of Bin Yu et al., appears infeasible because sufficient knowledge of data is not known at point where adaptation would occur.
- 4 Examined constructing suboptimal non-uniform successive refinement quantizers. Believe that constrained versions of optimal algorithm is appropriate approach.
- 5 As alternative approach to 2, looked at using ideas from Li and Lei's approach to rate-distortion optimal embedding to guide adaptive quantization. Literature caused me to realize efficient zero coding of significance decisions more appropriate.

# Termination Report Summary

## Air Force Research Laboratory For Associates Who Ended Tenure Between 8/15/2001 and 10/14/2002

1/10/2003 Page 1 of 2  
[r\_term\_summary]

Name	Start/Term Dates	Mnths*	Journal Articles	Dom/Intl Presentations	Awrds	Patents	Know	Tech	Motiv	Rsch	Colleg	Think	Sci A
	T Rpt Recd	A Rpt Recd	Career/Long/Short**	Lab	NRC	Post-Tenure Plans							
Castle, Karen Janene	7/17/00	5/31/02	22	5									
	5/13/02		8	10	8	8							
Hinsz, Verlin Blaine	8/01/01	7/31/02	12	-	7	-							
	7/23/02		8	8	7	5							
College or University Professor													
College or University Professor													
Kobryanskii, Valerii Mikhailovich	9/04/01	9/03/02	12										
Langhoff, Peter Wolfgang													
	6/01/98	10/31/01	36										
Miller, J. Scott	7/17/00	3/04/02	20	1	1	10	3	5	5	4	Y	4	4
	6/17/02		7	9	7	10							
Research - National government (US or Foreign)													
Oka, Soichi	6/28/01	6/27/02	12		1	1	3	4	5	3	Y	4	4
	10/16/02	5/20/02	10	10	9	10							
PostDoc													
Osswald, Gary Allen	6/01/01	9/30/01	4										
Park, Soo-Young	3/01/00	2/20/02	24	6	13								
	2/05/02		8	9	7	8							
Research Position at Foreign Govt Lab													
Perel, Victor Yuryevich	7/17/00	7/16/02	24										
Rotman, Stanley Richard	10/01/01	9/30/02	12		3								
	10/30/02		10	10	10	10							
Research Position at Foreign Govt Lab													
Siegel, Stefan Guenther	6/01/01	5/31/02	12										
Skormin, Victor Arcady													
	10/26/99	8/31/01	14										
Tassev, Vladimir Lubomirov	9/01/00	8/31/02	24										

\* "Mnths" reflects the actual months the Associate was on Tenure accounting for leave of absences, etc. between the first award date and final termination date.  
 \*\*Beginning in year 2001 Associates were asked to assess both long and short term value to career.



**Air Force Research Laboratory**  
**For Associates Who Ended Tenure Between**  
**8/15/2001 and 10/14/2002**

**Totals for: AFRL**

Number of Terminated Assocs: 14

\* "Mnths" reflects the actual months the Associate was on Tenure accounting for leave of absences, etc. between the first award date and final termination date.

\*\*Beginning in year 2001 Associates were asked to assess both long and short term value to career.

# THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

## National Research Council Associateship Programs

### FINAL REPORT

Enter information electronically in Layout view.

Return this form directly to the NRC as an E-mail attachment, or print out and mail or fax.

1) Associate Last or Family Name		First Name	M.I.
Castle		Karen	J
2) FORWARDING Address (to which your tax statement will be mailed)		FORWARDING Phone and E-Mail (if known)	
112 Blue Spruce Lane #3 Mifflinburg, PA 17844		(570) 996-6804 karenjcastle@hotmail.com	
3) Today's Date		Dates of Tenure	
May 13, 2002		from July 17, 2000 to May 31, 2002	
4) Current Agency	Laboratory or NASA Center	Division / Branch / Directorate	
AFRL	VS	VSBT	

#### 5) NAME OF RESEARCH ADVISER

James Dodd

#### 6) TITLE OF RESEARCH PROPOSAL

Collisions Between Small Hydrocarbons and Hyperthermal Oxygen Atoms

#### 7) SUMMARY OF RESEARCH DURING TENURE Itemize significant findings in concise form, utilizing key concepts/words.

- 1) Characterized vibrational energy transfer efficiencies for the NO(v)-O system for v=1 and 2 at room temperature and for v=1 between 295 and 850 K
- 2) Explored possible experimental approaches for measuring the CO<sub>2</sub> (nu<sub>2</sub>) - O vibrationa relaxation: achieved stimulated Raman excitation of the CO<sub>2</sub> bending mode and monitored relaxation using transient diode laser absorption
- 3) Acquired/learned to use a Bruker step-scan FTIR spectrometer for measuring time-resolved reaction product distributions, worked with Bruker technicians to improve OPUS software and develop experimental approach
- 4) Acquired FTIR data following O\* + C<sub>2</sub>H<sub>4</sub> and O\* + C<sub>3</sub>H<sub>6</sub> reactions (products included vibrationally excited alkene, CO, HCO, and H<sub>2</sub>CO) and developed computer model for analyzing CO product distributions from multiple pathways
- 5) Explored the effects of using different o-atom sources on the O\*+C<sub>2</sub>H<sub>4</sub> reaction, and found that NO<sub>2</sub> and SO<sub>2</sub> sources yield very different CO product distributions

#### 8) RESEARCH IN PROGRESS Describe in no more than 100 words.

Vibrationally excited product distributions resulting from collisions between translationally excited O-atoms and small alkenes are being measured via step-scan FTIR emission spectroscopy. Products such as vibrationally excited C<sub>2</sub>H<sub>4</sub>, CO, HCO, and H<sub>2</sub>CO have been clearly identified from the ethylene-O reaction, with CO being the dominant IR-emitting product. Following propylene-O collisions, only vibrationally excited CO and C<sub>3</sub>H<sub>6</sub> have been identified. A model has been developed for characterizing CO product distributions, and preliminary analysis has shown a striking difference between the two O-atom precursors SO<sub>2</sub> and NO<sub>2</sub>. In my remaining time at AFRL, the model will be improved, data analysis will continue, and the 1-butene-O\* reaction will be investigated.

#### 9) PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

##### a) Publications in peer-reviewed journals

see in preparation, submitted

##### b) Books, book chapters, other publications

N/A

##### c) Manuscripts in preparation, manuscripts submitted

E.S. Hwang, K.J. Castle, and J.A. Dodd, "Vibrational Relaxation of NO(v=1) by Oxygen Atoms Between 295 and 825 K," Journal of Geophysical Research (submitted, 2002).

K.J. Castle and J.A. Dodd, "CO Product Distributions Following the  $O^* + C_2H_4$  Reaction: an Analysis by time-resolved FTIR Emission Spectroscopy," Journal of Physical Chemistry (in preparation, 2002).

10 *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide titles, inventors, and dates of applications.

N/A

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

N/A

Domestic

S.J. Lipson, R.D. Sharma, S.M. Miller, K.J. Castle, E.S. Hwang, J.B. Lipson, and J.A. Dodd, "Collisions of O Atoms with NO, CO<sub>2</sub>, and Hydrocarbons: Atmospheric Implications," AFOSR Contractors' Meeting, Irvine, CA, May 2001.

E.S. Hwang, K.J. Castle, and J.A. Dodd, "NO(v)-O and CO<sub>2</sub>(010)-O Vibrational Energy Transfer," Dynamics of Molecular Collisions Conference, Copper Mountain, CO, July 2001.

K.J. Castle, E.S. Hwang, and J.A. Dodd, "Kinetic Measurements of the Quenching of CO<sub>2</sub> (010) by O Atoms," American Chemical Society National Meeting, Chicago, IL, August 2001.

Karen J. Castle, Eunsook S. Hwang, and James A. Dodd, "Quenching of the bending modes of CO<sub>2</sub> by Atomic Oxygen," American Geophysical Union Fall Meeting, San Francisco, CA, December 2001.

Karen J. Castle, Eunsook S. Hwang, and James A. Dodd, "Collisions between Atomic Oxygen and Ethylene: A Study via Time-Resolved FTIR Emission Spectroscopy," AFOSR Contractors' Meeting, Waltham, MA, May 2002.

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* Include dates, names and locations of seminars.

Karen J. Castle, "Photochemistry of Molecules Oriented in a Uniform Electric Field," Central Michigan University, Mount Pleasant, MI, December 2001.

Karen J. Castle, Eunsook S. Hwang, and James A. Dodd, "Collisions between Atomic Oxygen and Ethylene: A Study via Time-Resolved FTIR Emission Spectroscopy," Southwest Missouri State University, Springfield, MO, January 2002.

Karen J. Castle, Eunsook S. Hwang, and James A. Dodd, "Collisions between Atomic Oxygen and Ethylene: A Study via Time-Resolved FTIR Emission Spectroscopy," Bucknell University, Lewisburg, PA, January, 2002.

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

N/A

14) *NEW POSITION TITLE*

Assistant Professor

15) *NEW POSITION ORGANIZATION* Provide name and address of organization.

Bucknell University  
Department of Chemistry  
Lewisburg, PA 17837

16) *NEW POSITION STATUS / CATEGORY* Please indicate only one.

- ☐ Remain at Host Agency as Permanent Employee  
☐ Remain at Host Agency as Contract/Temporary Employee

Abbreviate Host Laboratory/Center \_\_\_\_\_

- ☐ Research Position at Another US Government Laboratory  
☐ Administrative Position at US Government Laboratory  
☐ Research Position at Foreign Government Laboratory

- ☒ Research/Teaching at US College/University  
☐ Research/Teaching at Foreign College/University  
☐ Research/Admin Position in Industry  
☐ Research/Admin in Non-Profit Organization  
☐ Postdoctoral Research  
☐ Self Employed  
☐ Other Please specify \_\_\_\_\_

17) **APPRAISAL OF THE ASSOCIATESHIP PROGRAM** Please rate each of the following on a scale of 1 (poor) to 10 (excellent).

**Your experience as a NRC Research Associate in this federal Laboratory**

**8** Short-term value: development of knowledge, skills, and research productivity

**Comments:**

Lab personell have helped me develop skills in an area of research that was relatively new to me. The only real drawback was the delay in acquiring functioning equipment. It has also been somewhat difficult to obtain permission to present and publish work.

**10** Long-term value: how your NRC Associateship award affected your career to date

**Comments:**

This program really helped me decide what career path I'd like to take. I plan to continue with a related topic of research in my next position.

**Administrative Support**

**8** Quality of the support you received from the federal Laboratory

**8** Quality of the support you received from the NRC staff

**Comments:**

Some of my voice mail and email messages were either never answered or the responses were very slow. Otherwise, I have no complaints. I was pleasantly surprised that I never received a paycheck or a travel reimbursement later than expected.

18) **PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT**

The renewal process could be done a little more smoothly. Approval for my renewal wasn't granted until about 2 weeks before the end of my tenure.. not much time to find another position if necessary. It would be even better if appointments were initially made for 2 years rather than 1.

**US Postal Service mailing address**

Research Associateship Programs [TJ 2114]  
National Research Council  
2101 Constitution Avenue NW  
Washington, DC 20418

**fax**

202 - 334 - 2759

**website**

[www.national-academies.org/rup](http://www.national-academies.org/rup)

**Express Delivery address**

Research Associateship Programs [Suite 200]  
National Research Council  
1000 Thomas Jefferson Street, NW  
Washington, DC 20007

n:\AO Forms

NRC ASSOCIATESHIP OFFICE

Rev. 10/2001

ID#

cc:

cost-center #

# THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

## National Research Council Associateship Programs

### FINAL REPORT

Enter information electronically in Layout view.

Return this form directly to the NRC as an E-mail attachment, or print out and mail or fax.

1) Associate Last or Family Name		First Name	M.I.
Hinsz		Verlin	B
2) FORWARDING Address (to which your tax statement will be mailed)		FORWARDING Phone and E-Mail (if known)	
3711 10 <sup>th</sup> Street N., Unit B; Fargo, ND 58102-1020		(701) 231-7082; Verlin.Hinsz@NDSU.NoDak.edu	
3) Today's Date		Dates of Tenure	
July 23, 2002		from August 1, 2001 to July 31, 2002	
4) Current Agency	Laboratory or NASA Center	Division / Branch / Directorate	
AFRL	Brooks	AFRL/HEAI	

#### 5) NAME OF RESEARCH ADVISER

Barry P. Goettl (upon the retirement of Sam Schiflett)

#### 6) TITLE OF RESEARCH PROPOSAL

Crew Performance in Dynamic Task Environments

#### 7) SUMMARY OF RESEARCH DURING TENURE Itemize significant findings in concise form, utilizing key concepts/words.

- 1) Modeling Crew Performance in Dynamic Task Environments
- 2) Representing Performance of UAV Ground Station Crews
- 3) Benchmarks for AWACS Weapons Director Crews
- 4) Implications of a teams-as-information-processors perspective
- 5) Implications of information processing biases in teams for information warfare

#### 8) RESEARCH IN PROGRESS Describe in no more than 100 words.

I am working with members of the lab on data collection on a set of projects related to individual and team performance on a dynamic decision making task (AWACS Weapons Directors). AFOSR has asked AFRL-HEAI to conduct research to establish benchmarks for performance on the AWACS task. Because this NRC Associateship will not be renewed, data collection will be continued with AFRL scientists once my tenure ends. These scientists and I will then try to write up the results for publication (one project will result in a chapter invited for an edited volume of the Human Factors Society).

#### 9) PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

##### a) Publications in peer-reviewed journals

Due to the lengthy time lags in review and publication, no publications occurred during my award period.

##### b) Books, book chapters, other publications

Hinsz, V.B. (in press). Metacognition and mental models in groups: An illustration with metamemory of group recognition memory. To appear in E. Salas, S.M. Fiore, & J. A. Cannon-Bowers (Eds.), Team Cognition: Process and Performance at the Inter- and Intra-Individual Level. Washington, DC: American Psychological Association.

Tindale, R.S., Kameda, T., & Hinsz, V.B. (in press). Group decision making. In M.A. Hogg & J. Cooper (Eds.), Sage Handbook of Social Psychology. London: Sage.

##### c) Manuscripts in preparation, manuscripts submitted

Hinsz, V.B. (submitted). Competitiveness and competition influences in goal-setting situations. Human Performance.

Hinsz, V.B., & Jundt, D.K. (revision submitted). Exploring individual differences in a goal-setting situation using the Motivational Trait Questionnaire. Journal of Applied Social Psychology.

Hinsz, V.B. (submitted). Group judgments of the frequency of events: Accuracy, bias, social decision schemes, and out-of-range responses. Organizational Behavior and Human Decision Processes.

Hinsz, V.B., Tindale, R.S., & Nagao, D.H. (submitted). Accentuation and attenuation of information processing strategies and biases: The integration of base-rate and case-specific information. *Journal of Personality and Social Psychology*.

Hinsz, V.B. & Tindale, R.S. Group decision processes and shared task representations of information processing biases. Manuscript in preparation.

Hinsz, V.B. (submitted). A conceptual framework for team performance in dynamic task environments: An illustration with uninhabited air vehicle (UAV) ground-control station teams. *Military Psychology*.

Hinsz, V.B., & Ashworth, A.R.S. Memory for the types of display information presented to AWACS weapons directors. To appear in S.G. Schiflett, L.R., Elliott, E. Salas, & M.D. Covert (Eds.), *Scaled Worlds: Development, validation, and applications*. Hampshire, England: Ashgate Publishing Limited. Chapter in preparation.

#### 10 PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH

Provide titles, inventors, and dates of applications.

NONE

#### 11) PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

##### International

Hinsz, V.B., & Jundt, D.K. (2002). Individual differences in a goal-setting situation: Examination of the Motivational Trait Questionnaire. Paper presented at the 25th meeting of the International Congress of Applied Psychology, Singapore.

##### Domestic

Hinsz, V.B. (2001). Optimal and supra-optimal information processing in groups: A signal detection analysis. Paper presented at the meeting of the Society for Judgment and Decision Making, Orlando, FL.

Hinsz, V.B. (2001). Competitiveness and competition influences in goal setting situations. Paper to be presented at the American Psychological Association convention, San Francisco.

Chalikia, M.H., Hinsz, V.B., & Gunderson, P. (2001). An Application of Signal Detection Analysis to the Tritone Paradox. Paper presented at the meeting of the Psychonomic Society, Orlando, FL.

Hinsz, V.B., & Hoffman, P.K. (2002). Judgmental anchor influences on mock jurors' responsibility and award decisions. Paper presented at the annual meeting of the Society for Personality and Social Psychology, Savannah, GA.

Engel, S.G., & Hinsz, V.B. (2002). Perceptions of men's preferences in long and short term relationships: What men want and what women think men want. Paper presented at the annual meeting of the Midwestern Psychological Association, Chicago.

Hinsz, V.B. (2002). Group decision making and shared task representations. Invited paper presented at the annual meeting of the Midwestern Psychological Association, Chicago.

Jundt, D.K., & Hinsz, V.B. (2002). Affect influences on mechanisms that mediate the relationship between goals and performance. Paper presented at the annual meeting of the Midwestern Psychological Association, Chicago.

#### 12) SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES Include dates, names and locations of seminars.

Hinsz, V.B. (2001, September). A framework for information-processing in teams. Presented to the Information Systems Training Branch, Warfighter Training Division, Human Effectiveness Directorate, Air Force Research Laboratory, Brooks AFB, TX.

Hinsz, V.B. (2001, October). Implications for team training of the teams-as-information-processors perspective. Presented to the Information Systems Training Branch, Warfighter Training Division, Human Effectiveness Directorate, Air Force Research Laboratory, Brooks AFB, TX.

Hinsz, V.B. (2001, November). A conceptual framework for composing effective air crews. Presented to the Information Systems Training Branch, Warfighter Training Division, Human Effectiveness Directorate, Air Force Research Laboratory, Brooks AFB, TX.

Hinsz, V.B. (2001, November). The Psychology of Women's Hair: Evolutionary and Social Psychological Perspectives. Invited Presentation at Our Lady of the Lake University, San Antonio, TX.

Hinsz, V.B. (2002, March). Group and individual decision making for task performance goals. Invited presentation at the Department of Psychology, University of Texas - San Antonio.

Hinsz, V.B. (2002, April). Getting at the heart of information processing in teams. Invited presentation at the Department of Psychology, University of Central Florida.

Hinsz, V.B. (2002, April). Promises and pitfalls of shared mental models in groups. Invited presentation at the Department of Psychology, New Mexico State University.

Hinsz, V.B. (2002, May). Research on the groups-as-information-processors perspective. Invited presentation at the Department of Social and Organizational Psychology, University of Amsterdam.

Hinsz, V.B. (2002, February). Crew Performance in Dynamic Task Environments: A Hierarchy of Embedded Action-Control Models. Presented to the Warfighter Training Division, Human Effectiveness Directorate, Air Force Research Laboratory, Mesa AZ.

**13) PROFESSIONAL AWARDS RECEIVED DURING TENURE**

NONE

**14) NEW POSITION TITLE**

SAME AS PRIOR TO NRC AWARD -- Professor of Psychology

**15) NEW POSITION ORGANIZATION** Provide name and address of organization.

SAME AS PRIOR TO NRC AWARD -- Department of Psychology, North Dakota State University, Fargo, ND 58105

**16) NEW POSITION STATUS / CATEGORY** Please indicate only one.

- |  |  |
|--|--|
| <input type="checkbox"/> Remain at Host Agency as Permanent Employee           | <input checked="" type="checkbox"/> Research/Teaching at US College/University |
| <input type="checkbox"/> Remain at Host Agency as Contract/Temporary Employee  | <input type="checkbox"/> Research/Teaching at Foreign College/University       |
| Abbreviate Host Laboratory/Center _____  | <input type="checkbox"/> Research/Admin Position in Industry                   |
| <input type="checkbox"/> Research Position at Another US Government Laboratory | <input type="checkbox"/> Research/Admin in Non-Profit Organization             |
| <input type="checkbox"/> Administrative Position at US Government Laboratory   | <input type="checkbox"/> Postdoctoral Research                                 |
| <input type="checkbox"/> Research Position at Foreign Government Laboratory    | <input type="checkbox"/> Self Employed   |
|  | <input type="checkbox"/> Other Please specify _____                            |

**17) APPRAISAL OF THE ASSOCIATESHIP PROGRAM** Please rate each of the following on a scale of 1 (poor) to 10 (excellent).**Your experience as a NRC Research Associate in this federal Laboratory****8** Short-term value: development of knowledge, skills, and research productivity**Comments:**

I have been able to gain exposure to a variety of research topics of interest to the Air Force Research Laboratory. I also had the ability to spend time thinking about a number of questions related to team and individual performance on complex, dynamic tasks. Consequently, I was able to write up a number of projects while I was located at the Lab.

**8** Long-term value: how your NRC Associateship award affected your career to date**Comments:**

I found the award to be very valuable. My time at the Lab was rewarding. I believe my stature in the research community has increased based on the reputation I have gained from spending time in the lab. The true influence of the award on my career will be seen in the coming decade or so.

**Administrative Support****7** Quality of the support you received from the federal Laboratory**5** Quality of the support you received from the NRC staff**Comments:**

The travel expense report was inappropriate for personal travel, and NRC people got confused numerous times. Better instructions are required, and different categories of travel should be used. The mail problem at NRC was also very annoying.

**18) PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT**

Provide more information about how funding levels are determined for senior associates. Provide more information about how to complete travel forms. It is good to see that much of the paper work is now moving to the web, and so it is easier to complete at a workstation.

**US Postal Service mailing address**

Research Associateship Programs [TJ 2114]  
National Research Council  
101 Constitution Avenue NW  
Washington, DC 20418

NRC Forms  
ID#

**fax**

202 - 334 - 2759

**website**[www.national-academies.org/rap](http://www.national-academies.org/rap)

NRC ASSOCIATESHIP OFFICE

cc:

**Express Delivery address**

Research Associateship Programs [Suite 200]  
National Research Council  
1000 Thomas Jefferson Street, NW  
Washington, DC 20007

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# THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

National Research Council  
Associateship Programs

ASSOCIATESHIP PROGS

RECEIVED JUN 17 '02

## FINAL REPORT

Enter information electronically in Layout view.

Return this form directly to the NRC as an E-mail attachment, or print out and mail or fax.

1) Associate Last or Family Name		First Name	M.I.
Miller		James	S.
2) FORWARDING Address (to which your tax statement will be mailed)		FORWARDING Phone and E-Mail (if known)	
6066-D Thoroughbred Ct., Waldorf, MD 20603		(301) 885-0488 millerjs@ih.navy.mil	
3) Today's Date		Dates of Tenure	
April 4, 2002		from July 17, 2000 to March 4, 2002	
4) Current Agency	Laboratory or NASA Center	Division / Branch / Directorate	
AFRL		VSBXT	

5) NAME OF RESEARCH ADVISER

Rainer A. Dressler

6) TITLE OF RESEARCH PROPOSAL

State resolved reaction dynamics in collision induced dissociation of small, vibrationally excited diatomic and dimer ions

7) SUMMARY OF RESEARCH DURING TENURE Itemize significant findings in concise form, utilizing key concepts/words.

- 1) Developed the capability to measure the collisional energy dependence of state-selected ion-molecule reaction dynamics at the LBNL Advanced Light Source
- 2) Determined absolute Xenon charge exchange cross sections for direct use in electrostatic thruster models
- 3) Measured the influence of a charge transfer pathway on vibrational effects in ion-molecule reaction dynamics for use in vibrational scaling models
- 4)
- 5)

8) RESEARCH IN PROGRESS Describe in no more than 100 words.

9) PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

Miller, J.S., Pullins, S.H., Levandier, D.J., Chiu, Y.-h., Dressler, R.A., "Xenon charge exchange cross sections for electrostatic thruster models", J. Appl. Phys. 91, 948, 2002

b) Books, book chapters, other publications

c) Manuscripts in preparation, manuscripts submitted

"Chemical Reaction Dynamics of Highly Vibrationally excited Molecular Ions", Ximei Qian, Tao Zhang, Cheuk Y. Ng, Yu-hui Chiu, Dale J. Levandier, J. Scott Miller, Rainer A. Dressler to be submitted to Science

"Effects of charge-transfer in the collision-induced dissociation of the Ar<sub>2</sub><sup>+</sup> + Ar/Ne systems" Miller, J.S., Chiu, Y.-h., Levandier, D.J., Dressler, R.A.

10 PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH

Provide titles, inventors, and dates of applications.



11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

Domestic

Miller, J.S., Dressler, R.A., Chiu, Y.-h., Levandier, D.J. "Vibrational effects in collision-induced dissociation dynamics of diatomic ions", presented at the 221st ACS National Meeting April 1-5, 2001, San Deigo, CA

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* Include dates, names and locations of seminars.

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

Air Force Office of Scientific Research Star Team Award, 2000

14) *NEW POSITION TITLE*

Research Chemist

15) *NEW POSITION ORGANIZATION* Provide name and address of organization.

Naval Surface Warfare Center - Indian Head Division

16) *NEW POSITION STATUS / CATEGORY* Please indicate only one.

- ☐ Remain at Host Agency as Permanent Employee  
☐ Remain at Host Agency as Contract/Temporary Employee  
Abbreviate Host Laboratory/Center \_\_\_\_\_  
☒ Research Position at Another US Government Laboratory  
☐ Administrative Position at US Government Laboratory  
☐ Research Position at Foreign Government Laboratory

- ☐ Research/Teaching at US College/University  
☐ Research/Teaching at Foreign College/University  
☐ Research/Admin Position in Industry  
☐ Research/Admin in Non-Profit Organization  
☐ Postdoctoral Research  
☐ Self Employed  
☐ Other Please specify \_\_\_\_\_

17) *APPRAISAL OF THE ASSOCIATESHIP PROGRAM* Please rate each of the following on a scale of 1 (poor) to 10 (excellent).

**Your experience as a NRC Research Associate in this federal Laboratory**

**7** Short-term value: development of knowledge, skills, and research productivity

Comments:

My AFRL / NRC experience has significantly broadened my scientific KSAs, as I chose a significantly different field from my graduate research in which to perform my post-doctoral work. My exposure to the current interests of the Air Force has shed new light on my understanding of DOD mission critical and mission essential capabilities, and the role I can play in the development of these technologies.

**9** Long-term value: how your NRC Associateship award affected your career to date

Comments:

My NRC experience was essential to placing my current position. I believe the reputation of the NRC-RAP, my experience of performing research in a DOD facility, and the depth of experience provided by the RAP were equally important in obtaining my current position as a research chemist for the U.S. Navy.

**Administrative Support**

**7** Quality of the support you received from the federal Laboratory

**10** Quality of the support you received from the NRC staff

Comments:

18) *PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT*

I believe that the NRC Research Associateship Program could benefit greatly by providing specific management guidance to NRC-RAP advisors. I have seen that MANY scientists are thrust into program management, and are never trained in people management. I feel this is even more critical an issue in programs such as the NRC-RAP, since the competitive nature of the program attracts people capable of new ideas and independent research, which may or may not be nurtured in some facilities.

US Postal Service mailing address

Research Associateship Programs [TJ 2114]  
National Research Council  
2101 Constitution Avenue NW  
Washington, DC 20418

fax

202 - 334 - 2759

website

[www.national-academies.org/rap](http://www.national-academies.org/rap)

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## National Research Council Associateship Programs

### FINAL REPORT

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Return this form directly to the NRC as an E-mail attachment, or print out and mail or fax.

1) Associate Last or Family Name		First Name	M.I.
Oka		Soichi	N/A
2) FORWARDING Address (to which your tax statement will be mailed)		FORWARDING Phone(s) and E-Mail (if known)	
650 B-21 Oshima, Anabuki-Cho, Mima-Gun, Tokushima-Ken, 777-0001, JAPAN		Phone: +81-883-53-7608 Phone: E-mail: OkaDayton@aol.com	
3) Today's Date		Dates of Tenure	
August 19, 2002		from June 25, 2001 to June 18, 2002	
4) Agency	Laboratory or NASA Center	Division / Branch / Directorate	
AFRL	ML	Material and Manufacturing Directorate	
5) NAME OF RESEARCH ADVISER			
Dr. Steven R. LeClair			
6) TITLE OF RESEARCH PROPOSAL			
The Development of Image Mining Software for Nondestructive/Hyper-Spectral Inspections using Neural Network Algorithms.			
7) SUMMARY OF RESEARCH DURING TENURE Itemize significant findings in concise form, utilizing key concepts/words.			
1) Image Mining of Evanescent Microwave Data for Nondestructive Material Inspection.			
2) Image Mining Using Coupled Unsupervised Neural Networks.			
3)			
4)			
5)			
8) RESEARCH IN PROGRESS Describe in no more than 100 words.			
I proposed an image mining algorithm for nondestructive inspection using microwave imaging. The developed image mining software automatically extracts a feature of spectral imaging by Tilt Noise Removal, Blind Deconvolution Deblurring, and Polygonal Approximation. The unsupervised neural networks visualize the spectral feature by a color variation.			
9) PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH			
Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.			
a) Publications in peer-reviewed journals			
b) Books, book chapters, other publications			
c) Manuscripts in preparation, manuscripts submitted			
"Image mining using coupled unsupervised neural networks", Soichi Oka.			
10) PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH			
Provide titles, inventors, and dates of applications.			
11) PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES			
Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.			
International			

• "Hyper-Spectral Vision by Self-Organization Neural Networks", The third international conference on Intelligent Processing and Manufacturing of Materials, July 29-August 3, 2001, Vancouver, Canada.

Domestic

12) SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES Include dates, names and locations of seminars.

• "Feature Extraction of Hyper-Spectral Imaging by Self-Organization Neural Network", Condensed Matter Seminar, Department of Physics, University of Cincinnati, March 6, 2002.

13) PROFESSIONAL AWARDS RECEIVED DURING TENURE

14) NEW POSITION TITLE

Postdoctoral Research

15) NEW POSITION ORGANIZATION Provide name and address of organization.

Dept. of Physics, University of Cincinnati, Cincinnati, OH, 45221

16) NEW POSITION STATUS / CATEGORY Please indicate only one.

- ☐ Remain at Host Agency as Permanent Employee  
☐ Remain at Host Agency as Contract/Temporary Employee  
Abbreviate Host Laboratory/Center \_\_\_\_\_  
☐ Research Position at Another US Government Laboratory  
☐ Administrative Position at US Government Laboratory  
☐ Research Position at Foreign Government Laboratory

- ☐ Research/Teaching at US College/University  
☐ Research/Teaching at Foreign College/University  
☐ Research/Administration in Industry  
☐ Research/Administration in Non-Profit Organization  
☒ Postdoctoral Research  
☐ Self Employed  
☐ Other: specify \_\_\_\_\_

17) APPRAISAL OF THE ASSOCIATESHIP PROGRAM Please rate each of the following on a scale of 1 (poor) to 10 (excellent).

**Your experience as a NRC Research Associate in this federal Laboratory**

10 Short-term value: development of knowledge, skills, and research productivity  
Comments:

10 Long-term value: how your NRC Associateship award affected your career to date  
Comments:

**Administrative Support**

9 Quality of the support you received from the federal Laboratory

10 Quality of the support you received from the NRC staff  
Comments:

18) PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT

I could not use a high-speed internet connection at AFRL due to the security rule. The laboratory should supply ADSL service instead of the slow modem connection.

**US Postal Service mailing address**  
Research Associateship Programs  
National Research Council  
500 Fifth Street, NW [GR 322A]  
Washington, DC 20001

fax  
202 - 334 - 2759  
[rap@nas.edu](mailto:rap@nas.edu)  
website  
[www.national-academies.org/rap](http://www.national-academies.org/rap)

**Express Delivery address**  
Research Associateship Programs  
National Research Council  
2001 Wisconsin Avenue, NW [GR 322A]  
Washington, DC 20007

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# THE NATIONAL ACADEMIES

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National Research Council

Associateship Programs

## FINAL REPORT

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FEB 05 2002

ASSOCIATESHIP PROGRAMS

Return this form directly to the NRC as an E-mail attachment, or print out and mail or fax.

1) Associate Last or Family Name		First Name	M.I.
Park		Soo-Young	
2) FORWARDING Address (to which your tax statement will be mailed)		FORWARDING Phone and E-Mail (if known)	
201 Dong 404 Ho, DaeRim 2 cha APT, Ja-dong, Sinsigagi, Haeundae-Gu, Pusan, Korea (ROK), 612-756		82-51-702-4353	
3) Today's Date		Dates of Tenure	
January 30, 2002		from March 1, 2000 to February 21, 2002	
4) Current Agency	Laboratory or NASA Center	Division / Branch / Directorate	
AFRL	AFRL	ML	

5) NAME OF RESEARCH ADVISER

Dr. D.S. Dudis/Dr. Barry Farmer

6) TITLE OF RESEARCH PROPOSAL

Analysis of the Crystal Structure of Poly(difluorosilylenemethylene)

7) SUMMARY OF RESEARCH DURING TENURE Itemize significant findings in concise form, utilizing key concepts/words.

- 1) Studies on the structures and molecular modeling of poly(silylenemethylene)s
- 2) Studies on the structures and molecular modeling of naphthalene-based rigid rod polymers
- 3) Studies on the structures of sulfone-containing polymers
- 4) Studies on the wholly-aromatic thermotropic polyesters
- 5) Studies on the morphology of the PBO film for the fuel cell membrane

8) RESEARCH IN PROGRESS Describe in no more than 100 words.

The structures of novel polymers such as poly(silylenemethylene)s, sulfone-containing polymers, naphthalene-based rigid rod polymers, wholly-aromatic thermotropic polyesters and PBO films for fuel cell membrane were studied using X-ray, SEM, TEM and molecular modeling techniques. We can determine the chain conformations and chain packings in the crystals of these polymers through the close examination of X-ray and Electron diffraction patterns with associated molecular modeling techniques. From these studies, we found that the chemical modifications such as changing alkyl side chain length in poly(silylenemethylene)s, the replacement of phenylene ring with naphthalene ring in the rigid rod polymers, introduction of the sulfone groups in the side chains, and etc give huge effects on the structures, which are, in turn, strongly related to the properties of these polymers.

9) PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

1. "The Structure of Poly(di-n-propylsilylenemethylene)", S.Y. Park, L.V. Interrante, and B.L. Farmer, Polymer, 42(9), 4253, 2001.
2. "The Structures of Poly(di-n-alkylsilylenemethylene)", S.Y. Park, L.V. Interrante, and B.L. Farmer, Polymer, 42(9), 4261, 2001.
3. "Synthesis and Mesomorphic Properties of Poly(oxyethylene) with [(6-Heptylsulfonyl)hexylthio]-methyl Side Groups", J.C. Lee, K. Oh, H.B. Lee, Y.G. Kim, J.Y. Jho, S-Y. Kwak, S.Y. Park and B.L. Farmer, Makromol. Chem. Rapid Comm, 22(11), 815, 2001.
4. "The Structures of Poly(oxyethylene)s having Sulfone Groups in the Side Chains", S.Y. Park, B.L. Farmer and J.C. Lee, Polymer, 43(1), 167, 2001
5. "The Structure of a Cyanodiphenyl Liquid Crystalline Poly(silylenemethylene)", S.Y. Park, T. Zhang, L.V. Interrante and B.L. Farmer, accepted to Polymer.
6. "The Structures of Side Chain Liquid Crystalline Poly(silylenemethylene)s", S.Y. Park, T. Zhang, L.V. Interrante and B.L. Farmer, accepted to Macromolecules.

b) Books, book chapters, other publications

c) Manuscripts in preparation, manuscripts submitted

1. "Synthesis of Comb-Type Polycarbosilane via Nucleophilic Substitution Reactions on the Main Chain Silicon Atoms", T. Zhang, S.Y. Park, B.L. Farmer and L.V. Interrante, submitted to *Macromolecules*.
2. "Synthesis, Characterization and Amphiphilic Liquid Crystallinity of Poly(oxyethylene)s Containing Alkylsulfonmethyl Side Groups", J.C. Lee, K.S. Oh, M.Y. Lim, Y.G. Kim, H.B. Lee, S.Y. Park and B.L. Farmer, submitted to *Macromolecules*.

10) *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide titles, inventors, and dates of applications.

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

Domestic

1. "Structural Studies on Naphthalene based Rigid-Rod Benzobisthiazole Polymers", S.Y. Park, J.W. Lee, N. Venkatasubramanian, T.D. Dang, F.E. Arnold and B.L. Farmer, ACS Polymer preprint, Orlando FA, April 2002.
2. "The Structure of a Cyanobiphenyl Side Chain Liquid Crystalline Poly(silylenemethylene)", S.Y. Park, T.Zhang, L.V. Interrante and B.L. Farmer, ACS Polymer preprint, Orlando FA, April 2002.
3. "Synthesis and Characterization of Rigid-Rod Benzobisazole Polymers incorporating Naphthalene 2,6- and 1,5-Diyl Structural Units", T.D. Dang, N. Venkatasubramanian, A. Talicska, S.Y. Park and F.E. Arnold, ACS Polymer preprint, Orlando FA, April 2002.
4. "Structure and Morphology of Rigid-Rod Polymer (PBO, PBT) Membranes", R. Ozisik, S. Putthanarat, L. Zhu, R.K. Eby, S.Y. Park, H. Koerner, T.D. Dang, B.L. Farmer, APS Abstract, Indianapolis IN, Mar 2002.
5. "Structural Studies on Naphthalene based Rigid-Rod Benzobisthiazole Polymers", S.Y. Park, J.W. Lee, N. Venkatasubramanian, T.D. Dang, F.E. Arnold and B.L. Farmer, APS Abstract, Indianapolis IN, Mar 2002.
6. "Structural and Morphological Characterizations of PBO Membranes for High Temperature Fuel Cells", H. Koerner, S.Juhl, S.Y. Park, T.D. Dang, B.L. Farmer, R. Ozisik, S. Puttanarat, R.K. Eby, APS Abstract, Indianapolis IN, Mar 2002.
7. "Structures of poly(silylenemethylene)s", Soo-Young Park, Tao Zhang, L.V. Interrante and B.L. Farmer, Denver X-ray Conference, 2001, Aug., Steamboat Spring, CO.
8. "Structure of side chain liquid crystalline poly(silylenemethylene)s", Soo-Young Park, Tao Zhang, L.V. Interrante and B.L. Farmer, ACS, 2001, Mar, San Diego, CA.
9. "Side Chain liquid Crystalline poly(silylenemethylene)s", Soo-Young Park, B.L. Farmer, Tao Zhang, L.V. Interrante, APS, 2001, Mar, Seattle, WA.
10. "Synthesis of liquid crystalline poly(oxyethylene)s containing poly(nonylsulfonyl) hexylsulfonyl side groups by chemical modification of poly(epichlorohydrin)", J.C. Lee, Y.G. Kim, H.B. Lee, K. Oh, S.Y. Park, B.L. Farmer, ACS, 2000 Aug, Washington, D.C.
11. "The structure of side chain liquid crystalline poly(silylenemethylene)s", S.Y. Park, T. Zhang, L.V. Interrante, and B.L. Farmer, ACS Mar, San Francisco, CA, 2000
12. "Synthesis and Characterization of Novel Side Chain Liquid Crystalline Poly(silylenemethylene)s Empolying a Si-O-C Linkage", T. Zhang, S.Y. Park, B.L. Farmer, and L.V. Interrante, ACS, 2000 Mar, San Francisco, CA, 2000
13. "Studies of the Structure of Poly(silylenemethylene)s", S.Y. Park, T. Zhang, L.V. Interrante, and B.L. Farmer, APS, 2000 Mar, Minneapolis, MN

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* Include dates, names and locations of seminars.

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

14) *NEW POSITION TITLE*

assistant professor

15) **NEW POSITION ORGANIZATION** Provide name and address of organization.

Department of polymer science and engineering, Kyungbuk National University, 1370, SanKyeK-Dong, Buk-Gu, DaeKu, Korea (ROK), 702-701.

16) **NEW POSITION STATUS / CATEGORY** Please indicate only one.

- ☐ Remain at Host Agency as Permanent Employee  
☐ Remain at Host Agency as Contract/Temporary Employee  
Abbreviate Host Laboratory/Center \_\_\_\_\_  
☐ Research Position at Another US Government Laboratory  
☐ Administrative Position at US Government Laboratory  
☐ Research Position at Foreign Government Laboratory

- ☐ Research/Teaching at US College/University  
☒ Research/Teaching at Foreign College/University  
☐ Research/Admin Position in Industry  
☐ Research/Admin in Non-Profit Organization  
☐ Postdoctoral Research  
☐ Self Employed  
☐ Other Please specify \_\_\_\_\_

17) **APPRAISAL OF THE ASSOCIATESHIP PROGRAM** Please rate each of the following on a scale of 1 (poor) to 10 (excellent).

**Your experience as a NRC Research Associate in this federal Laboratory**

8 Short-term value: development of knowledge, skills, and research productivity

**Comments:**

I have gathered a lot of knowledge from AFRL personnels and developed a lot of skills during my tenure. However, the security issues for foreign nationals in military base cause sometimes difficulties such as working at weekend and using networks, etc.

9 Long-term value: how your NRC Associateship award affected your career to date

**Comments:**

Working as a NRC research associate in the federal nation laboratory helps me to find my professional job. I would like to appreciate my current advisor, Dr. Barry Farmer and to continue collaboration with AFRL after my tenure.

**Administrative Support**

7 Quality of the support you received from the federal Laboratory

8 Quality of the support you received from the NRC staff

**Comments:**

Reimbursement process for travel seems a little bit slow. I had also a little difficulty in arranging my travel through NAS travel agency because of low diem rate for hotel arranged by meeting organization.

18) **PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT**

**US Postal Service mailing address**

Research Associateship Programs [TJ 2114]  
National Research Council  
2101 Constitution Avenue NW  
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**fax**

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**website**

[www.national-academies.org/rap](http://www.national-academies.org/rap)

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Washington, DC 20007

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## FINAL REPORT

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1) Associate Last or Family Name		First Name	M.I.
Rotman		Stanley	R.
2) FORWARDING Address (to which your tax statement will be mailed)		FORWARDING Phone(s) and E-Mail (if known)	
Mishol Givon 10, Beer-Sheva 84804, ISRAEL		Phone: +972-8-6461539 Phone: +972-8-6413531 E-mail: srotman@ee.bgu.ac.il	
3) Today's Date		Dates of Tenure	
September 12, 2002		from October 1, 2001 to September 30, 2002	
4) Agency	Laboratory or NASA Center	Division / Branch / Directorate	
AFRL		SNHI	

### 5) NAME OF RESEARCH ADVISER

Jerry Silverman/ Richard Soref

### 6) TITLE OF RESEARCH PROPOSAL

Signal Processing of Hyperspectral Data

### 7) SUMMARY OF RESEARCH DURING TENURE Itemize significant findings in concise form, utilizing key concepts/words.

- 1) We demonstrate segmentations of hyperspectral imagery based on of the most significant principal components of the hyperspectral data cube. Anomalous pixels are then found and morphological operations allow us to detect targets.
- 2) Two methods for detecting point targets in hyperspectral images were attempted. The first uses the principal component images; the second is based on a median-filtered full hyperspectral cube. Detection vs. false alarm comparisons are made.
- 3) Developed a course on the digital signal processing of hyperspectral imagery. I taught this course to interested AFRL personnel.
- 4)
- 5)

### 8) RESEARCH IN PROGRESS Describe in no more than 100 words.

We are continuing to work on point target anomaly detection. We will use the sophisticated techniques of orthogonal subspace projection to eliminate background clutter and improve the signal to noise ratio.

### 9) PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

#### a) Publications in peer-reviewed journals

#### b) Books, book chapters, other publications

J. Silverman, S.R. Rotman and C.E. Caefer, "Segmentation of Hyperspectral Images from the Histograms of Principal Components", in Imaging Spectrometry VIII, Sylvia S. Shen, Editor, Proceedings of SPIE Vol. 4816 (2002)

J. Silverman and S.R. Rotman, "Segmentations of hyperspectral imagery: techniques and applications", Proc. SPIE 4820

C. E. Caefer, S.R. Rotman, J. Silverman, and P.W. Yip, "Algorithms for point target detection in hyperspectral imagery", in Imaging Spectrometry VIII, Sylvia S. Shen, Editor, Proceedings of SPIE Vol. 4816 (2002),

#### c) Manuscripts in preparation, manuscripts submitted

J. Silverman, Stanley R. Rotman and Charlene E. Caefer, "Target Cueing from Segmented Hyperspectral Images", to be submitted to IEEE Trans. Geo. Remote Sensing.



10 *PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH*

Provide titles, inventors, and dates of applications.

11) *PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES*

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

Domestic

J. Silverman, S.R. Rotman and C.E. Cafer, "Segmentation of Hyperspectral Images from the Histograms of Principal Components", presented at the International Symposium on Optical Science and Technology, SPIE 47<sup>th</sup> Annual Meeting, Seattle, Washington, July 7-11, 2002

C. E. Cafer, S.R. Rotman, J. Silverman, and P.W. Yip, "Algorithms for point target detection in hyperspectral imagery", presented at the International Symposium on Optical Science and Technology, SPIE 47th Annual Meeting, Seattle, Washington, July 7-11, 2002

J. Silverman and S.R. Rotman, "Segmentations of hyperspectral imagery: techniques and applications", presented at the International Symposium on Optical Science and Technology, SPIE 47th Annual Meeting, Seattle, Washington, July 7-11, 2002 (INVITED PAPER) .

12) *SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES* Include dates, names and locations of seminars.

13) *PROFESSIONAL AWARDS RECEIVED DURING TENURE*

14) *NEW POSITION TITLE*

Going back to Prof. Stanley Rotman

15) *NEW POSITION ORGANIZATION* Provide name and address of organization.

Going back to Ben-Gurion Univ. of the Negev, Dept. of Elec. and Comp. Eng. , P.O.Box 653, Beer-Sheva, ISRAEL

16) *NEW POSITION STATUS / CATEGORY* Please indicate only one.

- |  |   |
|--|---|
| <input type="checkbox"/> Remain at Host Agency as Permanent Employee           | <input type="checkbox"/> Research/Teaching at US College/University                 |
| <input type="checkbox"/> Remain at Host Agency as Contract/Temporary Employee  | <input checked="" type="checkbox"/> Research/Teaching at Foreign College/University |
| Abbreviate Host Laboratory/Center _____  | <input type="checkbox"/> Research/Administration in Industry                        |
| <input type="checkbox"/> Research Position at Another US Government Laboratory | <input type="checkbox"/> Research/Administration in Non-Profit Organization         |
| <input type="checkbox"/> Administrative Position at US Government Laboratory   | <input type="checkbox"/> Postdoctoral Research                                      |
| <input type="checkbox"/> Research Position at Foreign Government Laboratory    | <input type="checkbox"/> Self Employed  |
|  | <input type="checkbox"/> Other: specify _____                                       |

17) *APPRAISAL OF THE ASSOCIATESHIP PROGRAM* Please rate each of the following on a scale of 1 (poor) to 10 (excellent).

**Your experience as a NRC Research Associate in this federal Laboratory**

**10** Short-term value: development of knowledge, skills, and research productivity

Comments:

I have been introduced to an entirely new field for me, i.e. hyperspectral signal processing. I have been given the opportunity to work with experts in the field who have been working in this for years; I have been given access to data. This year has been wonderful in introducing me in the best way possible to this field.

**10** Long-term value: how your NRC Associateship award affected your career to date

Comments:

I fully expect to continue working in this field. I have submitted a proposal for continued work to the EOARD; I have been contacted by several companies in Israel that are interested in this area of work. This was a jump start for me that I really needed.

**Administrative Support**

**10** Quality of the support you received from the federal Laboratory

**10** Quality of the support you received from the NRC staff

**Comments:**

The NRC was extremely willing to help with all aspects of my move and my stay here in the U.S. The laboratory as a whole, the branch chief Paul Pellegrini, and the researchers in the brance (and, in particular, my supervisor Jerry Silverman and my coworker Charlene Caefer) have been most generous with their time and efforts in helping me.

**18) PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT**

I'm sorry - it's been perfect. (And I'm not just saying that - this is easily the best working environment that I have ever been in over the last 26 years.)

**US Postal Service mailing address**

Research Associateship Programs  
National Research Council  
500 Fifth Street, NW [GR 322A]  
Washington, DC 20001

**fax**

202 - 334 - 2759

**rap@nas.edu**

**website**

[www.national-academies.org/rap](http://www.national-academies.org/rap)

**Express Delivery address**

Research Associateship Programs  
National Research Council  
2001 Wisconsin Avenue, NW [GR 322A]  
Washington, DC 20007

n:\AO Forms

NRC ASSOCIATESHIP OFFICE

Rev. 10/2001

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# THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

National Research Council  
Associateship Programs

## FINAL REPORT

Enter information electronically in Layout view.

Return this form directly to the NRC as an E-mail attachment, or print out and mail or fax.

1) Associate Last or Family Name <b>Wilson</b>		First Name <b>John</b>	M.I. <b>P</b>
2) FORWARDING Address (to which your tax statement will be mailed) <b>10047 Phillips Rd. Lafayette, CO 80026</b>		FORWARDING Phone and E-Mail (if known) <b>(303) 665-9658 wilsonjohnpat@acm.org</b>	
3) Today's Date <b>August 19, 2002</b>		Dates of Tenure from <b>August 20, 2001</b> to <b>August 19, 2002</b>	
4) Current Agency <b>AFRL</b>	Laboratory or NASA Center	Division / Branch / Directorate <b>Information Directorate</b>	

5) NAME OF RESEARCH ADVISER

**Bruce Suter**

6) TITLE OF RESEARCH PROPOSAL

**Compression of High Data Rate Sources: Theoretical Gains with Non-Ideal Models**

7) SUMMARY OF RESEARCH DURING TENURE Itemize significant findings in concise form, utilizing key concepts/words.

- 1) Found that it is not possible to construct a Uniform Reconstruction Quantizer that is a Successive Refinement Quantizer
- 2) Approach to embedded context-based adaptive quantization along the lines of the non-embedded work of Bin Yu et al., appears infeasible because sufficient knowledge of data is not known at point where adaptation would occur.
- 3) Examined constructing suboptimal non-uniform successive refinement quantizers. Believe that constrained version of optimal algorithm is appropriate approach.
- 4) As alternative approach to 2, looked at using ideas from Li and Lei's approach to rate-distortion optimal embedding to guide adaptive quantization. Literature caused me to realize efficient zero coding of significance decisions more appropriate.
- 5)

8) RESEARCH IN PROGRESS Describe in no more than 100 words.

I am currently implementing a channel coder for use with ERC-SPIHT video coder.

I have also developed a number of ideas for further research examining using knowledge of error to steer processing of data and examining how errors are passed through the wavelet transform.

9) PUBLICATIONS AND PAPERS RESULTING FROM NRC ASSOCIATESHIP RESEARCH

Provide complete citations: author(s), title, full name of journal, volume number, page number(s), and year of publication.

a) Publications in peer-reviewed journals

N/A

b) Books, book chapters, other publications

N/A

c) Manuscripts in preparation, manuscripts submitted

N/A

10) PATENT OR COPYRIGHT APPLICATIONS RESULTING FROM NRC ASSOCIATESHIP RESEARCH

Provide titles, inventors, and dates of applications.

N/A

11) PRESENTATIONS AT SCIENTIFIC MEETINGS OR CONFERENCES

Provide complete references: author(s), title, abstract/proceeding citation, meeting name and location.

International

John P. Wilson, Compression of Barotropic Turbulence Simulation Data using Wavelet-based Lossy Coding, Proceedings ASME Fluids Engineering Division Summer Meeting, Montreal, Quebec, Canada, July 2002.

Domestic

John P. Wilson, Wavelet-based Lossy Compression of Barotropic Turbulence Simulation Data, IEEE Data Compression Conference Poster Session, Snowbird, Utah, April 2002.

12) SEMINARS OR LECTURES DELIVERED AT UNIVERSITIES AND/OR INSTITUTES Include dates, names and locations of seminars.

N/A

13) PROFESSIONAL AWARDS RECEIVED DURING TENURE

N/A

14) NEW POSITION TITLE

No position

15) NEW POSITION ORGANIZATION Provide name and address of organization.

N/A

16) NEW POSITION STATUS / CATEGORY Please indicate only one.

- ☐ Remain at Host Agency as Permanent Employee  
☐ Remain at Host Agency as Contract/Temporary Employee

Abbreviate Host Laboratory/Center \_\_\_\_\_

- ☐ Research Position at Another US Government Laboratory  
☐ Administrative Position at US Government Laboratory  
☐ Research Position at Foreign Government Laboratory

- ☐ Research/Teaching at US College/University  
☐ Research/Teaching at Foreign College/University  
☐ Research/Admin Position in Industry  
☐ Research/Admin in Non-Profit Organization  
☐ Postdoctoral Research  
☐ Self Employed  
☒ Other Please specify Unemployed

17) APPRAISAL OF THE ASSOCIATESHIP PROGRAM Please rate each of the following on a scale of 1 (poor) to 10 (excellent).

**Your experience as a NRC Research Associate in this federal Laboratory**

5 Short-term value: development of knowledge, skills, and research productivity

**Comments:**

I arrived with about 6 projects, which resulted in a 9 item research to do list. The vast majority of my projects resulted in either negative results or explorations showed that the project was unlikely to be worthwhile. There were two projects which I felt had substantial merit which I made little progress on due to the need to have discussions with persons in the exploitation section.

4 Long-term value: how your NRC Associateship award affected your career to date

**Comments:**

I have managed to flesh out some of my research ideas related to the interaction of data compression with the processing of the data.

**Administrative Support**

8 Quality of the support you received from the federal Laboratory

6 Quality of the support you received from the NRC staff

**Comments:**

I had significant problems with the responsiveness of NRC staff.

18) PLEASE PROVIDE ANY SUGGESTIONS FOR PROGRAM IMPROVEMENT

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202 - 334 - 2759

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